FRD ACTIVITIES REPORT
January - March 2011

RESEARCH PROGRAMS

NOAA Support for Japanese Earthquake

After the earthquake in Japan damaged the Fukushima nuclear power reactors, FRD started getting requests for possible support from higher levels in NOAA. Initially the requests centered on whether existing balloon platforms could be adapted for radiological monitoring. FRD quickly came up with a balloon concept that could measure geographic position, altitude, radiological dose rate, and possibly pressure. However, the reactor situation evolved before the idea went beyond the concept stage. Feedback was also provided on interpreting some of the dispersion modeling that had been done for the reactors. (Richard.Eckman@noaa.gov, Roger Carter, Randy Johnson, Shane Beard, Tom Strong)

DOE Wind Energy Forecast Improvement Study

Preparations are in progress for the Wind Forecast Improvement Project (WFIP) slated to begin July 1. Kirk Clawson traveled to the project area in Texas in March to evaluate the three individual study sites and plan access, logistics, communications, and other matters.

Other preparatory work was being done from Idaho Falls. A radar wind profiler, a fully instrumented meteorological tower, three miniSODARs, and three sonic anemometers will be deployed in Texas by FRD. The data protocols and communications necessary to archive and acquire the data and perform the requisite quality control for all of these instruments are being developed. This is a critical component of the project because one of the project requirements is that a remote, reliable, automated upload of the data to a database must occur on an hourly basis within 10 minutes after the end of the hour.

FRD only has one miniSODAR available so it has been necessary to investigate the most effective way in terms of cost and logistics to acquire two additional miniSODARs. Rental and lease options were considered but it was finally decided to purchase two new miniSODARs. The purchase request was placed in March and it is presently being processed through channels. An approximately 10% negative wind speed bias has been identified in the one miniSODAR that is currently owned by FRD and efforts are underway to determine the source of this bias and make the appropriate corrections or repairs.

As part of the preparations for the project, Jesse Leach from ESRL visited FRD on March 2-3 to provide training on the two upgraded radar wind profiler systems owned by FRD. He also provided some very useful trouble shooting and maintenance tips for the systems and tested all of the antenna panels of the radar installed at the INL. (Dennis.Finn@noaa.gov)

HRRR Collaboration with ESRL

FRD has been downloading subsets of the High Resolution Rapid Refresh (HRRR) model since last year. The model forecasts are being compared with observations from the NOAA/INL Mesonet in Southeast Idaho. On average the model wind speeds are only about 2/3 of the observed values. At the initial time of the model runs the analyzed model winds often appear to be closer to the observations (as one would expect), but the winds rapidly decelerate to significantly lower speeds by the first hour into the model run and stay low thereafter. This is rather perplexing, because preliminary reports from the ARL Atmospheric Turbulence and Diffusion Division (ATDD) indicate the HRRR wind forecasts are doing much better over one of their field sites in Texas. One possibility is that the model's boundary-layer parameterization does not work as well in the complex terrain of the Intermountain West. (Richard.Eckman@noaa.gov).

Cheaperclipper

A presentation on the WISDOM Intensity/ WHISSP concept was given at the DoD METOC conference in late January. The presentation included data from the balloons that we released from Tybee Island, GA, in early December 2010. (Randy.Johnson@noaa.gov)

U.S. Historical Climate Network–Modernization

Funding has now ended for data quality control of the U.S. Historical Climate Network/Modernization, a program currently being operated by our sister division in Oak Ridge, TN. In support of this project, FRD developed a web page and numerous plotting programs for quality checking the data on a daily and weekly basis that has been ongoing since July 2009. Monthly progress reports were also submitted detailing performance of the instrumentation as well as development of new programs for quality control. It is being proposed that all of the plotting programs and web page be maintained at FRD until they are transferred and operational at ATDD. However, the manual daily and weekly review of the HCN-M/CRN data at FRD, and the monthly progress reports will be terminated. (Jason.Rich@noaa.gov)

Tracer Sampler New Tubing Tests

Latex tubing is presently being used in the tracer sampler boxes and sample bag cartridges, but it is highly susceptible to degradation in the presence of sunlight or oxidants such as ozone. It has been necessary in the past to replace the tubing every few years due to cracking and potential leaks that develop. For this reason, it was decided to evaluate alternative types of tubing that satisfied requirements for strength and elasticity but were also less susceptible to being degraded. Tests on the alternative types of tubing are underway. One test is an evaluation of the possibility of leaks that could cause a dilution of concentration in a sample bag held over an extended period of time. Another test evaluates the possibility that some tracer gas might adsorb to the walls of the tubing and subsequently contaminate the bag after it has been cleaned. That could adversely affect the analysis of low level tracer concentrations. Both SF_6 and PFT tracers are being tested.

Collaboration with SORD

FRD has started collaboration with the ARL Special Operations and Research Division (SORD) in Las Vegas on developing improved methods for generating input for the HYSPLIT dispersion model. HYSPLIT already has an extensive capability to use prognostic model forecasts to drive the dispersion, but it has only a limited capability to use observations from meteorological networks (mesonets) such as

those operated by FRD and SORD. The current capability is limited to simple interpolation between towers in the mesonets. FRD and SORD plan to collaborate on developing a new capability that uses mesonet observations but also includes physical constraints to the air flow around and over topography. Initially the effort will investigate whether existing software, such as the Local Area Prediction System (LAPS), can be adapted for use with HYSPLIT. (Richard.Eckman@noaa.gov)

Tracer Dispersion Proposals

Four major tracer dispersion proposals were prepared during the last quarter and the first four working days of this quarter. The proposals were due by January 6, which is the date when most of them were submitted. These proposals, if funded, could keep FRD actively working in tracer dispersion field projects for the next 5 years. FRD partnered with U.S. Army Dugway Proving Ground, ITT, Desert Research Institute, and the National Center for Atmospheric Research, among others, to prepare the proposals. Two proposals were submitted to DARPA (Defense Advanced Research Projects Agency) and two were submitted to DTRA (Defense Threat Reduction Agency). (Kirk.Clawson@noaa.gov)

NOAA/IDAHO NATIONAL LABORATORY (INL) METEOROLOGICAL RESEARCH PARTNERSHIP

Emergency Operations Center (EOC)

On January 11, Team B participated in an EOC drill at the newly remodeled INL EOC. The scenario used canned weather, so there was little for the FRD dispersion expert to contribute to the drill. However, he used the time to exercise the reinstalled equipment and check for proper operation of all the components. (Kirk.Clawson@noaa.gov)

Team A participated in a drill at the newly renovated EOC on February 1. This drill centered on a leaking drum containing GSB-78. FRD provided current and short term weather forecasts and ran the Aloha plume model during the drill. (Jason.Rich@noaa.gov)

Team D was involved in a drill on February 22. It involved a chemical release at the MFC facility. Canned weather was used for the drill, however, so NOAA's participation was limited. (Richard.Eckman@noaa.gov)

FRD participated in an EOC drill on March 16 as a member of Team C. The drill scenario featured a leaking sealant drum and used canned weather. The ALOHA plume model was run for each of the components of the sealant. (Dennis.Finn@noaa.gov)

INL Hazardous Weather Alert System

After a relatively quiet start to 2011, the weather pattern became more active as low pressure systems moved across southeastern Idaho. As a result, ten NOAA/INL severe weather statements/alerts were issued during February and March. All of the alerts were issued for high winds, i.e., average winds exceeding 25 mph. The NOAA/INL Weather Center issued these alerts because the INL has stricter guidelines than those used by the National Weather Service for the general public. (Jason.Rich@noaa.gov)

Transport and Dispersion Modeling

Initial work was begun on developing an upgrade for the FRD implementation of HYSPLIT for use in radiological modeling at the Emergency Operations Center of the INL. Portions of this work are being done in collaboration with the overall ARL effort to upgrade the HYSPLIT model. Elements of the HYSPLIT work at FRD have either already been incorporated into ARL HYSPLIT or will be adopted in the future. (Brad.Reese@noaa.gov, Dennis Finn)

In December FRD purchased a new computer for running the HYSPLIT model. This system has dual processors and an Nvidia Graphics Processing Unit (GPU) for high-performance computing. During January work was started on installing the software required for running HYSPLIT. Problems arose, however, in getting the computer connected to the local area network. After investigation it turned out that the problem was in the building wiring and not in the computer. The networking issue did delay the work long enough that the model software installation was not completed before the time set aside for this activity expired. It is hoped the new system will be activated in the third quarter of the fiscal year. (Richard.Eckman@noaa.gov)

Last year FRD conducted a modeling study related to the Advanced Test Reactor (ATR) at INL. This study used five years of data from the NOAA/INL Mesonet to develop a climatology of dispersion from the ATR. During the second quarter, INL requested that FRD perform additional modeling simulations for the reactor. The original modeling runs assumed a surface release from the reactor site, while the new ones will assume an elevated release. A statement of work is being developed for the new effort. (Richard.Eckman@noaa.gov)

On March 24 a presentation was given to the INL Monitoring and Surveillance Committee on the HYSPLIT Decision Support Tool being developed by FRD. The presentation included a demonstration of the tool. (Richard.Eckman@noaa.gov)

NOAA/INL Mesoscale Meteorological Network (Mesonet)

Jesse Leach from ESRL in Boulder, CO, visited FRD to install new radar wind profiler software, to provide training on the new software, and to test the radar antennas installed at the NOAA/INL Mesonet Grid 3 facility. The radar wind profiler antennas tested passed all tests. The new software was installed and other system components were tested. It was subsequently determined that the beam switches had failed. Additional software and hardware improvements were recommended and the training was provided. The failed switches have been replaced and the suggested improvements have been implemented. (Randy.Johnson@noaa.gov)

OTHER ACTIVITIES

Papers

Finn, D., K.L. Clawson, R.G. Carter, J.D. Rich, C. Biltoft, and M. Leach (2010). Analysis of Urban Atmosphere Plume Concentration Fluctuations. *Boundary-Layer Meteorol.*, 136:431-456 (doi:10.1007/s10546-010-9510-3)

Safety

During January's monthly staff meeting, the employees viewed "Working in the Cold" video by Coastal Video Communications Corp.

At February's monthly staff meeting, everyone viewed a video on "Managing Radiation".

During the reporting quarter, a SPOTII GPS Messenger was purchased and installed in the electronic technician's utility pickup. This device will provide the exact location of the technicians in the field in case of an emergency and/or need of medical assistance.

Training

Kirk Clawson and Jason Rich attended a Python software training seminar the weekend preceding the AMS conference in Seattle in January. Dennis Finn attended a wind energy seminar on the same weekend at the same event.

All employees completed the required INL annual training (Annual Security Briefing for Un-cleared Employees, Controlled Unclassified Information, ES&H Awareness Refresher, INL ISO 14001/EMS Training, and Counterintelligence)

Jesse Leach from ESRL provides radar profiler training for the entire staff on March 2-3.

"MSDS Communicating Chemical Safety" by Industrial Training systems Corp. was viewed at the March staff meeting.

On March 22, Bryan Parker with FOCI Organizational Effectiveness Consultants, LLC provided the staff with a communication training workshop. The workshop helped us foster better interpersonal communication skills.

Travel

Kirk Clawson to Boulder, CO, to attend the Wind Forecast Improvement Project (WFIP) kick-off meeting, January 12-13.

Kirk Clawson, Jason Rich, and Dennis Finn attended the 91st Annual American Meteorological Society conference in Seattle, WA the week of January 24-28.

Outreach

In February, Julie Tullis, a teacher at Hillcrest High School in Idaho Falls, brought four students aging from 17 to 18 years old from her Dynamic Earth class to tour our facilities. Dennis Finn, Randy Johnson and Rick Eckman shared their expertise on various projects.

In February Rick Eckman answered another Ask a Scientist question for the Idaho Falls newspaper. This question was related to the lag observed between the astronomical and meteorological seasons.

Rick Eckman continued to serve as a committee member for a Ph.D. candidate at the University of Wyoming in Laramie. A brief committee meeting was held in March, and the student's final exam is scheduled for late May.

ARL Laboratory Review

Many of the staff has been involved in preparing for the quadrennial OAR review of the Air Resources Laboratory. Three PowerPoint presentations, one poster presentation, and several hardware and software demonstrations have been prepared. In addition, an five-minute introductory video was prepared describing FRD, including its location, capabilities, facilities and relationship with the INL, among other things. This video is available for viewing at http://www.noaa.inel.gov/docs/FRD Primer Final 4-15-11.wmv. Preparations have also included participation in two dry runs on February 15-16 and March 9-10, where the presentations, poster, and handouts were presented during a webinar for practice and internal review leading up to the actual review. Another dry run is scheduled in April. The review is scheduled to take place at ARL headquarters in Silver Spring, MD, May 3-5. Six FRD employees will be traveling to Silver Spring to participate in the review.